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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/694,272      | 10/27/2003  | Daniel C. Merkel     | H0003789US          | 2794             |

7590 01/19/2005  
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EXAMINER

WITHERSPOON, SIKARL A

ART UNIT PAPER NUMBER

1621

DATE MAILED: 01/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |   |                                      |  |
|------------------------------|---|--------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/694,272    | <b>Applicant(s)</b><br>MERKEL ET AL. |  |
|                              | <b>Examiner</b><br>Sikar A. Witherspoon | <b>Art Unit</b><br>1621              |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-75 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-75 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/18/04</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION*****Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 5, 7-12, 14 and 15 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 7 of copending Application No. 10/671,810. Although the conflicting claims are not identical, they are not patentably distinct from each other because both are drawn to a process for preparing a fluoropropene by dehydrohalogenation of the corresponding halogenated propane, in the presence of a caustic solution of an alkali metal or alkaline earth metal hydroxide. The difference between the instant claims of the two applications are that the present application includes a non-aqueous, non-alcohol solvent, while the copending application does not expressly recite a solvent.

This is not a patentable distinction between the two applications because copending application '810 using open-ended, i.e., "comprising" language in describing the process therein, and as such does not preclude the presence of a solvent.

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Furthermore, copending application '810 states on page 10 of the specification that the dehydrohalogenation may be conducted using solvents, i.e., polar solvents, such as nitriles. Therefore, the use of a solvent was at least contemplated by applicants in the copending application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim 38 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 32 of copending Application No. 10/671,810. Although the conflicting claims are not identical, they are not patentably distinct from each other because both applications are drawn to the thermal decomposition of a halopropane to form a fluoropropene; the difference is that the instant claim is drawn to the reaction of a halopropane having a generic structure, to form a fluoropropene having a generic structure, while the instant claim in the '810 application is drawn to a specific reactant(s) and a specific product.

This is not a patentable distinction because the generic formula of the reactant(s) and product in the instant application encompasses the reactant(s) and product formed in the instant claim of the copending application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 38 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The instant claim recites the thermal decomposition of a *halopropene* in the instant dehydrohalogenation process; however, all of the subsequent claims are drawn to a *halopropane* reactant. It is the examiner's belief that applicants' intent was for the instant claim to recite a "halopropane" as the reactant, and as such, proper correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 38, 39, 41, 46-49, 51 and 52 are rejected under 35 U.S.C. 102(b) as being anticipated by Elsheikh et al (US 6,124,510).

Elsheikh et al disclose a process for preparing HFC-1234ze (1,1,1,3-tetrafluoropropene) by dehydrofluorinating 1,1,1,3,3-pentafluoropropane using a chromium-base catalyst, at a temperature from 100 to 600° C, under atmospheric temperature (col. 1, lines 25-53). Examples 1 and 2 recite a reaction temperature of 400° C (col. 2, lines 15-34). The process described herein anticipates the instant claims.

Claims 40, 42-45, 50, 53-71, although not anticipated as are the above claims, are rejected under 35 U.S.C. 103(a) as being unpatentable over Elsheikh et al and further in view of VanDerPuy et al (US 5,574,192).

The instant claims limit the dehydrohalogenation process of the present invention to the decomposing being conducted without a catalyst, the catalyst being selected from iron, nickel, or cobalt halides, the reactant being 1-chloro-1,3,3,3-tetrafluoropropane and/or 1,1,1,3,3-pentafluoropropane, the process being conducted under super atmospheric pressure, and said reactants being prepared by fluorinating 1,1,1,3,3-pentachloropropane with hydrogen fluoride in the vapor phase, or liquid phase, in the presence of a fluorination catalyst, and feeding chlorine to the fluorinating reaction to keep the fluorination catalyst active.

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As stated above, Elsheikh et al teach a process for preparing HFC-1234ze (1,1,1,3-tetrafluoropropene) by dehydrofluorinating 1,1,1,3,3-pentafluoropropane using a chromium-base catalyst, at a temperature from 100 to 600° C, under atmospheric temperature (col. 1, lines 25-53). Examples 1 and 2 recite a reaction temperature of 400° C (col. 2, lines 15-34).

The differences between Elsheikh et al and the instant invention are that Elsheikh et al do not expressly teach the absence of a catalyst or conducting the process at super atmospheric pressure, and do not teach 1-chloro-1,3,3,3-tetrafluoropropane as a reactant, nor a process wherein said 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane reactants are produced.

With regard to the first difference, the examiner purports that while Elsheikh et al do not expressly teach the absence of a catalyst, it would have been obvious to a person of ordinary skill in the art to conduct the dehydrohalogenation with or without a catalyst. Catalysts are normally employed in processes in order to enhance the efficiency of a given reaction. There is nothing in the reference that suggests that the dehydrohalogenation reaction would not proceed in the absence of a catalyst. Furthermore, the high reaction temperature taught by Elsheikh et al , alone, would be sufficient to effect decomposition of the reactant to the desired fluoropropene.

With regard to the pressure, the reference states that the process *can* be conducted at atmospheric pressure; however there is no suggestion in the reference that the pressure at which the reaction is conducted is critical. To that end, the examiner purports that absent a showing of unexpected results by applicants, it would

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have been obvious to a person of ordinary skill to conduct the dehydrohalogenation process taught by Elsheikh et al at any pressure that would afford optimal conversion of the precursor compound(s) to the fluoropropene product.

While Elsheikh et al do not specifically teach 1-chloro-1,3,3,3-tetrafluoropropane as a reactant, nor a process wherein said 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane reactants are produced, VanDerPuy et al teach a process for preparing 1,1,1,3,3-pentafluoropropane in the liquid or gas phase by reacting 1,1,1,3,3-pentachloropropane with HF in the presence of a chloride of pentavalent antimony as catalyst, at 135° C and a pressure of about 1965 to 2655 Kpa (although pressure is not critical). 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane are both produced (example 3, col. 6, lines 1-22). VanDerPuy et al also teach that catalyst based on halides of niobium, tantalum, and arsenic may also be employed (col. 3, lines 1-10). The catalyst may be periodically regenerated by adding chlorine (col. 3, lines 23-31).

It therefore would have been obvious to a person of ordinary skill in the art to combine the fluorination process taught by VanDerPuy et al, with the dehydrofluorination process taught by Elsheikh et al. A person of ordinary skill would have been motivated to combine such teachings by the desire to prepare the halopropane precursor(s) that would be dehydrohalogenated to produce the desired fluoropropene in the process taught by Elsheikh et al.

It would have been rendered further obvious that both 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane could be dehydrohalogenated



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simultaneously to product the target fluoropropene, i.e., 1,1,1,3-tetrafluoropropene, in the process taught by Elsheikh et al, since VanDerPuy et al teach that 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane are co-products produced in the fluorination of pentachloropropane, and as such, it would have been reasonable to expect that the starting material, i.e., halopropane in the process of Elsheikh et al would comprise a mixture of the two previously mentioned halopropanes, if said mixture was prepared by the fluorination process taught by VanDerPuy et al.

Claims 1-37 and 72-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elsheikh et al (US 6,124,510) and Nair et al (US 6,548,719) in combination and further in view of VanDerPuy et al (US 5,574,192).

The instant claims are drawn to a dehydrohalogenation process for preparing fluoropropenes by reacting a halopropane with a caustic solution of at least one alkali metal or alkaline earth metal hydroxide in a non-aqueous, non-alcohol solvent. Further limitations include the reactant comprising 1-chloro-1,3,3,3-tetrafluoropropane, 1,1,1,3,3-pentafluoropropane, or both, the solvent being a nitrile, ether, ester, amide, ketone, etc., the caustic strength being from 2 to 100 weight percent, and the 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane being prepared by fluorinating 1,1,1,3,3-pentachloropropane with hydrogen fluoride in the presence of a fluorination catalyst in the gas or liquid phase.

Elsheikh et al teach a process for preparing HFC-1234ze (1,1,1,3-tetrafluoropropene) by dehydrofluorinating 1,1,1,3,3-pentafluoropropane using a strong

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base such as an aqueous or alcoholic solution of potassium hydroxide, sodium hydroxide, calcium hydroxide, or magnesium hydroxide, at a temperature from 20 to about 100° C (col. 2, lines 1-10 and 38-43).

The differences between Elsheikh et al and the instant claims are that Elsheikh et al do not teach the reaction solvents or the concentration of the caustic solution, as recited in the instant claims, do not teach 1-chloro-1,3,3,3-tetrafluoropropane as a reactant, nor a process wherein said 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane reactants are produced.

With regard to the first difference, Nair et al teach a similar process for preparing fluoroolefins, wherein the amount of caustic may be at a concentration of from 1 to 50 weight percent, and wherein a solvent or diluent such as alcohols like methanol and ethanol, ethers, such as diethyl ether, esters, such as methyl acetate and ethyl acetate, and fluorinated diluents, such as perfluorotetrahydrofuran, may be employed (col. 3, lines 26-29, and 40-56).

It therefore would have been obvious to a person of ordinary skill in the art, at the time the present invention was made, to employ such a concentration of caustic that would afford optimal conversion of the halopropane to the desired fluoropropene, since Nair et al teach such a wide concentration range of caustic solution that may be employed in such processes. It would also have been obvious to a person of ordinary skill to conduct the dehydrofluorination taught by Elsheikh et al in the presence of a solvent or diluent, since Nair et al teach that solvents may be employed in such

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processes. A person of ordinary skill would have been motivated to employ a solvent by the desire to modify the system viscosity, as suggest by Nair et al.

As stated above, Elsheikh et al do not specifically teach 1-chloro-1,3,3,3-tetrafluoropropane as a reactant, nor a process wherein said 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane reactants are produced, VanDerPuy et al teach a process for preparing 1,1,1,3,3-pentafluoropropane in the liquid or gas phase by reacting 1,1,1,3,3-pentachloropropane with HF in the presence of a chloride of pentavalent antimony as catalyst, at 135° C and a pressure of about 1965 to 2655 Kpa (although pressure is not critical). 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane are both produced (example 3, col. 6, lines 1-22). VanDeyPuy et al also teach that catalyst based on halides of niobium, tantalum, and arsenic may also be employed (col. 3, lines 1-10). The catalyst may be periodically regenerated by adding chlorine (col. 3, lines 23-31).

It therefore would have been obvious to a person of ordinary skill in the art to combine the fluorination process taught by VanDerPuy et al, with the dehydrofluorination process taught by Elsheikh et al. A person of ordinary skill would have been motivation to combine such teachings by the desire to prepare the halopropane precursor(s) that would be dehydrohalogenated to produce the desired fluoropropene in the process taught by Elsheikh et al.

It would have been rendered further obvious that both 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane could be dehydrohalogenated simultaneously to product the target fluoropropene, i.e., 1,1,1,3-tetrafluoropropene, in

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the process taught by Elsheikh et al, since VanDerPuy et al teach that 1-chloro-1,3,3,3-tetrafluoropropane and 1,1,1,3,3-pentafluoropropane are co-products produced in the fluorination of pentachloropropane, and as such, it would have been reasonable to expect that the starting material, i.e., halopropane in the process of Elsheikh et al would comprise a mixture of the two previously mentioned halopropanes, if said mixture was prepared by the fluorination process taught by VanDerPuy et al.

### ***Claim Objections***

Claims 52 and 75 are objected to because of the following informalities: the instant claims lack proper punctuation. Appropriate correction is required.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikarl A. Witherspoon whose telephone number is 571-272-0649. The examiner can normally be reached on M-F 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann Richter can be reached on 571-272-0646. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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